

Remarks/Arguments:

Amendments

The Abstract has been amended. Claims 11 and 12 have been cancelled. Claim 9 has been amended to change dependency. Claim 13 reintroduces a limitation of cancelled claim 8, which was supported by claim 1 as originally filed. It is submitted that no new matter is introduced by these amendments. It is submitted that these amendments do not introduce any new questions of patentability. The limitation of newly presented claim 13 was previously considered by the Office. Entry of this amendment is respectfully requested.

Objection to the Specification

The Specification was objected to because of a typographical error in the Abstract. An amended Abstract has been supplied.

Rejection under 35 USC 112, ¶ 1

Claims 11 and 12 were rejected under 35 USC 112, ¶ 1. Claims 11 and 12 have been cancelled.

Rejection under 35 USC § 102(e)

Claims 1-5 and 9-10 were rejected under 35 U.S.C. §102(e) as anticipated by Carlson, U.S. Patent 6,153, 337 ("Carlson"). For the following reasons, this rejection is respectfully traversed.

As discussed in the previous communication, Carlson discloses "coating onto a substrate a liquid mixture comprising a boehmite sol and then during the coating to form the microporous pseudo-boehmite layer with binder present. . . ." Carlson, column 4, lines 19-21. "In a most preferred embodiment, the substrate comprises a cathode coating layer on at least one outermost surface and the liquid mixture comprising the boehmite sol is coated onto the cathode coating layer." Carlson, column 4, lines 29-32.

Claim 1 and claims 2-5, 9, and 13, dependent there n

Claim 1 recites a structure that comprises in order: 1) an electrode plate for a battery; 2) a surface on the electrode plate having thereon an oxide layer formed by boehmite treatment; and 3) a layer of electrode active material on the oxide layer. The Office asserts that Carlson discloses this structure. This rejection is respectfully traversed.

In general, Carlson discloses coating a boehmite-containing layer on a separator. Abstract. However, Carlson also discloses that the layer can be coated on a "cathode coating layer." Column 4, lines 24-34, and claim 62.

As understood by applicants, the Office position is that Carlson anticipates claim 1 because:

- 1) The cathode coating layer of Carlson is equivalent to applicants' electrode plate.
- 2) The boehmite layer of Carlson is equivalent to applicants' oxide layer formed by boehmite treatment.
- 3) The electrolyte of Carlson is equivalent to applicants' layer of electrode active material.

Each of these assertions is respectfully traversed and will be addressed in turn. If any one of these assertions is shown to be incorrect, anticipation has been rebutted. See, for example, *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 231 U.S.P.Q. 81, 90 (Fed. Cir. 1980) (axiomatic that for a prior art reference to anticipate under § 102 it has to meet every element of the claimed invention (emphasis added)).

Cathode Coating Layer

The Office position is that "Carlson discloses coating a cathode (i.e. electrode) with a boehmite coating (boehmite sol). Paper 13, page 8, lines 14-16. This position is respectfully traversed. What Carlson does disclose is coating a "cathode coating layer" with a boehmite sol.

Carlson does not define "cathode coating layer." The term only appears in the sections relied on by the Office and in the claims. However, in Example 7 a layer of boehmite was coated directly on the cathode. Carlson, column 19, lines 16-19. The cathode was similar to

that of Comparative Example 3, which was similar to the cathode of Comparative Example 2, which was made up of a layer containing a cathode active material (carbon-sulfur polymer) on a conductive carbon and resin coated aluminum foil substrate. Carlson, Column 17, lines 12-34.

Carlson does not explicitly state on which side of the cathode the layer was coated. However, for the layer to function as a separator, its intended purpose (column 3, lines 34-40), it must be coated onto the layer of cathode material, not onto aluminum surface of the opposite side of the aluminum foil substrate. Thus, "cathode coating layer" refers to the layer of cathode active material on the aluminum substrate. This conclusion is further supported by claim 62 in which the substrate and the cathode coating layer are separate elements of the claim. The boehmite sol is coated onto the cathode coating layer, not onto the substrate. See also, Carlson, column 9, lines 31-32 ("the separator is coated directly onto the cathode layer").

Applicants' claims recite a layer on a surface on the electrode plate having thereon an oxide layer formed by boehmite treatment. In Carlson, the boehmite layer is on the cathode active material, not onto the aluminum substrate (electrode plate). Thus, this limitation of applicants' claims is not met. For this reason, the rejection of claim 1 as anticipated by Carlson should be withdrawn.

In support of this rejection, the Office also asserts, without support, that "aluminum inherently forms an oxide layer." Paper 13, page 4, lines 1-2. While the surface of aluminum metal may form a thin film of aluminum oxide under ambient conditions, applicants' claim 1 does not recite an oxide layer. Applicants' claim 1 recites an "oxide layer being formed by applying a boehmite treatment to the electrode plate surface," *i.e.*, a layer of boehmite (hydrated aluminum oxide).

The Office has neither asserted nor provided any evidence that a layer of hydrated aluminum oxide forms on an aluminum surface under ambient conditions. Further, claims 3 and 4 each recite a thickness range for the boehmite layer. The Office has neither asserted nor provided any evidence that the thickness any layer of aluminum oxide that may form on an aluminum surface under ambient conditions falls within the thickness range recited by these claims. The Office is respectfully requested to provide such evidence or it will be concluded that none exists.

Boehmite Treatment

The Office position is that "Carson discloses . . . applying a boehmite treatment to the electrode plate (coating with boehmite) Paper 13, page 4, lines 7-12, see also page 8, lines 13-15. The Office also asserts that, "In a larger sense," it is not clear "exactly what the 'boehmite treatment' constitutes." In short, the Office position is that the term "boehmite treatment" is unclear. Thus, Carlson's process of coating with boehmite constitutes a "boehmite treatment" within the scope of applicants' claims. This position is respectfully traversed.

Applicants' position is that the term "boehmite treatment" has a recognized meaning in the art, a meaning that does not include Carlson's coating process. In support of this position, applicants call the attention of the Office to the following disclosures. Each of these disclosures is found in a reference relied on by the Office to reject one or more of applicants' claims.

Nikaido, U.S. Patent 4,105,511 ("Nikaido"), which is of record in this application, discloses:

One of such methods is known as so-called boehmite treatment by which aluminum or aluminum alloy is brought into contact with hot water or steam containing or not containing ammonia or amines so as to form on the surface of aluminum or aluminum alloy an aluminum oxide layer predominantly consisting of $A_2O_3 \cdot nH_2O$ wherein n is usually an integer of 1 to 3.

Nikaido, column 1, lines 20-27 (emphasis added).

Saruwatari, U.S. Patent 4,759,805 ("Saruwatari"), which is of record in this application, discloses:

As the hydrophilic film, a boehmite film by a boehmite treatment, an anodic oxide film by anodizing, a chromate film or zinc phosphate film by chemical conversion and the like are used. The boehmite film is obtained by subjecting the roughened conductor surface to weak alkali boiling water or steam of which pH is adjusted to 8.5 to 10 by adding a small amount of alkali substance such as ammonia, triethanol amine and diethylamine. Alternatively, the conductor surface is subjected to deionized boiling water or steam. The boehmite film thus obtained is composed of hydroxides representative of $(AlO.OH)_2$ or

$\text{Al}_2\text{O}_3 \cdot \text{H}_2\text{O}$ and has a thickness of 0.05 to 2 μm . The film is non-porous and has a smooth surface, and exhibits an excellent hydrophilic nature.

Saruwatari, column 3, lines 8-19 (emphasis added).

It is apparent that the term "boehmite treatment," as used in the art, refers to a process in which an aluminum surface is oxidized to boehmite (a form of hydrated aluminum oxide) by the application of heat, water and/or steam, and optionally a weak base, such as ammonia or an amine. This is not the coating process used by Carlson.

Carlson does not disclose a "boehmite treatment" as that term is understood in the art. Boehmite treatment, as that term is understood in the art, would not produce the layer disclosed by Carlson. Boehmite treatment produces a layer of hydrated aluminum oxide. In contrast, Carlson's layer contains a binder, which would not be present in a layer formed by a boehmite treatment. Carlson, column 9, lines 30-37. In addition, Saruwatari discloses that a layer formed by a boehmite treatment is non-porous. See, Saruwatari, column 3, lines 17-29, reproduced above. Carlson's coating is porous. See, Carlson, column 3, lines 44-51.

Carlson's boehmite layer is neither an oxide layer formed by boehmite treatment nor does it have the same composition and structure as an oxide layer formed by a boehmite treatment. For this additional reason, the rejection of claim 1 as anticipated by Carlson should be withdrawn.

Electrode Active Material

Carlson discloses applying an organic electrolyte to the boehmite coating. The Office position is that Carlson discloses . . . "applying a paste (sol) comprising an electrode active material (organic electrolyte) to the oxide layer" Paper 13, page 4, lines 7-12, see also Page 9, lines 10-15. The Office also asserts that "the term 'electrode active material' can have a plethora of meanings" Page 2, lines 16-18. Thus, it can be assigned the meaning given to it by the Office.

The Office position is that the term "electrode active material" can include an organic electrolyte so that Carlson's electrolyte falls within the scope of applicants' claims. This position is respectfully traversed.

Attention is called to the McGraw-Hill Dictionary of Scientific and Technical Terms, 5th ed., McGraw-Hill, New York, 1994, p. 29, a copy of which is enclosed for the Examiner's convenience. Definition 4 of "active material" reads as follows: "In a battery, the chemically reactive material in either of the electrodes that participates in the charge and discharge reactions." (emphasis added) Addition of the adjective "electrode" to "active material" merely emphasizes that it is the active material for a battery.

Carlson's use of the terms electroactive material, electrochemically active material, cathode active material, and anode active material is consistent with this definition. See, Carlson, column 1, lines 21-42. For example, Carlson refers to cathode and anode active materials as being in a reduced or in an oxidized state, clear reference to the chemically reactive materials that participate in the charge and discharge reactions. There is no indication that Carlson intended any of these terms to include the electrolyte. Electrolytes are described separately. Carlson, column 10, line 66, to column 12, line 11.

The term "electrode active material " has a clear meaning in the art, as evidenced by the reference cited above. It refers to the chemically reactive material in either of the electrodes that participates in the charge and discharge reactions. This definition does not include Carlson's electrolyte. Thus, Carlson does not disclose an electrode active material on the surface on an oxide layer as recited by applicants' claim 1. For this additional reason, the rejection of claim 1 as anticipated by Carlson should be withdrawn.

Conclusion

Each of the three assertions required to reject claim 1 as anticipated by Carlson has been shown to be incorrect. For each and all these reasons the rejection of claim 1 as anticipated by Carlson should be withdrawn. Further the rejection of claims 2-5, 9, and 13, dependent thereon, should be withdrawn.

Claim 10

Claim 10 is a method claim that recites a process for producing an electrode plate. The second step is "forming an oxide layer on the electrode plate by applying a boehmite treatment to the electrode plate." As discussed above, the coating process of Carlson is not a boehmite treatment as that term is understood by the art. Therefore, this step is missing from Carlson's process. The third step is "applying a paste comprising an electrode active material to the

oxide layer." As discussed above, the electrode material of Carlson is not an "electrode active material as that term is understood by the art. Therefore, this step is also missing from Carlson's process. For either or both of these reasons the rejection of claim 10 as anticipated by Carlson should be withdrawn.

First Rejection under 35 USC 102(b)

Claims 1 and 3 were rejected under 35 U.S.C. §102(b) as anticipated by Nikaido. This rejection is respectfully traversed.

The Office position is that Nikaido discloses "subjecting an aluminum or aluminum alloy to a boehmite treatment, followed by electrolysis using the resulting aluminum or aluminum alloy as the electrode . . . and thereby forming a new layer. See e.g. column 1, 64 *et seq.*" Paper 13, page 7, lines 16-19. The Office position is also that the term "electrode active material" can have a plethora of meanings, *including an aluminum oxide layer*, which is disclosed *inter alia* in the abstract of Nikaido. . . . Paper 13, page 2, lines 16-18 (emphasis original).

As applicants' understand the Office position as stated in passages cited above, the aluminum oxide layer disclosed in the Abstract of Nikaido corresponds to the "electrode active material" recited in applicants' claim 1. This assertion is respectfully traversed.

As discussed above, applicants' claim 1 recites 1) an electrode plate for a battery; 2) a surface on the electrode plate having thereon an oxide layer formed by boehmite treatment; and 3) a layer of electrode active material on the oxide layer. The Abstract of Nikaido discloses "contacting aluminum or aluminum alloy with hot water or steam to form an aluminum oxide layer thereon," that is, an oxide layer formed by a boehmite treatment.

The Office is asserting that Nikaido's aluminum oxide layer corresponds to two elements of applicants' claim 1: the oxide layer formed by boehmite treatment and the layer of electrode active material. Defining "electrode active material" as broadly as asserted by the Office and allowing the oxide layer to correspond to two elements of applicants' claim 1 would allow any boehmite treated aluminum to anticipate applicants' claim 1.

As discussed above, an electrode active material is "the chemically reactive material in either of the electrodes that participates in the charge and discharge reactions." Nikaido's

aluminum oxide layer is not a material that participates in charge and discharge reactions in a battery.

Nikaido does not disclose a layer of an electrode active material on an oxide layer formed by a boehmite treatment. The rejection of claim 1 as anticipated by Nakaido should be withdrawn.

Second Rejection under 35 USC 102(b)

Claims 1 and 12 were rejected under 35 U.S.C. §102(b) as anticipated by Saruwatari, U.S. Patent 4,759,805 ("Saruwatari"). Claim 12 has been cancelled. With respect to claim 1, this rejection is respectfully traversed.

The Office position is that Saruwatari discloses an electrode (aluminum conductor) having formed thereon an oxide layer (boehmite film), the oxide layer being formed by applying a boehmite treatment to the electrode plate surface and layer of an electrode active material is on the oxide layer (wetting agent), wherein the oxide layer is non-porous (non-porous boehmite layer). Paper 13, line 20, to page 14, line 1. Applicants' traverse the Office assertion that a wetting agent is an "electrode active material."

As discussed above, an electrode active material is "the chemically reactive material in either of the electrodes that participates in the charge and discharge reactions." Saruwatari's wetting agents are not materials that participate in charge and discharge reactions in a battery. Saruwatari's wetting agents are conventional anionic surfactants such as alkylsulfates and alkyl benzene sulfonates, conventional nonionic surfactants such as polyoxyethylene alkyl ethers and polyoxyethylene alkyl phenol ethers, and hydrophilic polymers such as polyvinyl alcohol and cellulose. See, Saruwatari, column 4, lines 3-20.

Saruwatari does not disclose a layer of an electrode active material on an oxide layer formed by a boehmite treatment. The rejection of claims 1 and 12 as anticipated by Saruwatari should be withdrawn.

Conclusion

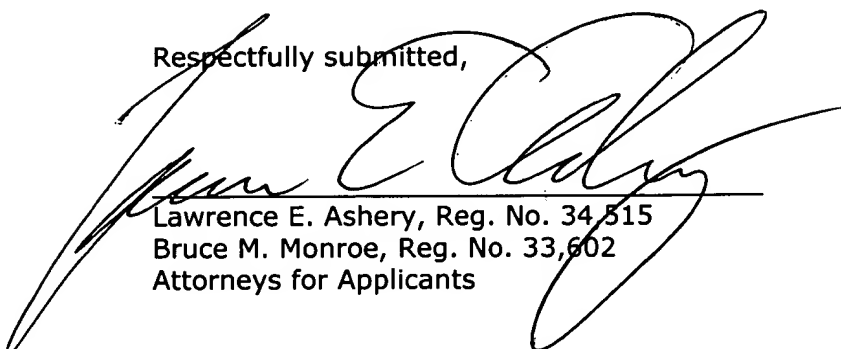
It is respectfully submitted that the claims are in condition for immediate allowance and a notice to this effect is earnestly solicited. The Examiner is invited to phone applicants'

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attorney if it is believed that a telephonic or personal interview would expedite prosecution of the application.

Respectfully submitted,



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Attachment: Abstract

Enclosure: McGraw-Hill Dictionary of Scientific and Technical Terms, 5th ed., McGraw-Hill, New York, 1994, p. 29.

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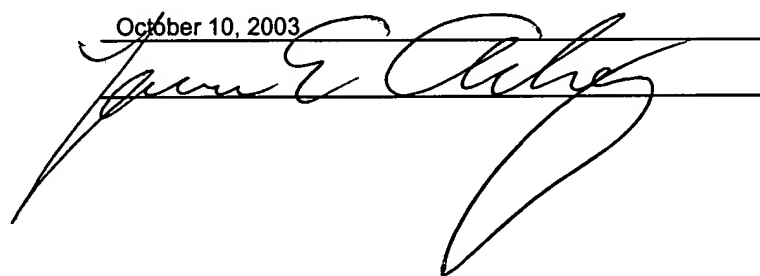
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ABSTRACT

A battery, in which measures are taken to suppress a reduction in charge/discharge capacity and degradation of load characteristics due to peeling of an active material off the current collector during repeated charging and discharging, is disclosed. Boehmite treatment or chromate treatment of the current collector surface of the electrode plate for the battery suppresses the degradation of charge/discharge capacity and load characteristics.